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# **The Clinical Conscientiousness Index: a valid tool to explore professionalism in the clinical undergraduate setting**

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## Abstract

**Background:** The need to develop effective tools to measure professionalism continues to challenge medical educators. Recently a novel measure of a facet of professionalism, the ‘Conscientiousness Index’ (CI), was explored. This involved collation of routinely collected administrative data, had good correlations with staff views on professionalism and was acceptable to students. To date this instrument has been validated in one site with pre-clinical medical students.

**Aim:** To investigate the validity of the Conscientiousness Index as a proxy measure of professionalism in a different context and in the clinical phases of the medical course.

**Methods:** Data similar to original work, but modified to the clinical setting (medical and context were collected on 124 year 3 medical students on clinical rotations. This included information on student attendance, timeliness of assessment submissions and evaluative feedback. The resultant *Clinical* Conscientiousness Index (CCI) was compared with staff views on professionalism and formal assessment of professionalism (portfolio and objective structured clinical examination).

**Results:** We demonstrate significant correlations between the CCI and staff views on professionalism ( $r_s = .3$   $p = .001$ ), and CCI and objective clinical structured examination score ( $r_s = .237$   $p = .008$ ), but no correlation between CCI and portfolio assessment ( $r_s = .084$ ,  $p = .354$ ). Relationships between CCI and demographics are also presented.

**Conclusion:** The Clinical Conscientiousness Index is a practical and valid proxy measure of professionalism, achieving good correlation with staff views on professionalism, and clinical competency examinations, but not portfolio performance, in a clinical undergraduate year.

Robust measures of professionalism continue to be elusive (1). This may be attributed to the complex nature of professionalism, which goes beyond the application of knowledge and skills to encompass humanism, accountability, altruism and the pursuit of excellence (2, 3). Recent suggestions include focusing on behaviours rather than attributes (4), thus many current methods of assessing professionalism rely on multiple snapshots of an individual's professionalism taken over a period of time (1). Such methods demand repeated measures to improve reliability and are resource intense. There has also been a growth in quantitative tools which focus on specific aspects of professionalism (5). Whilst many of these tools are used for research purposes, pragmatically they present opportunities for medical schools to gauge professionalism by practicable and defensible means.

One such measure is the Conscientiousness Index (6, 7). In an attempt to develop an objective, scalar proxy measure of the trait of professionalism, which could be shown to be valid and reliable, but also cost effective, a measure of diligence or conscientiousness has been explored. The 'Conscientiousness Index' (CI) was developed at Durham University, UK and consists of points awarded and deducted for a range of objective administrative measures, resulting in each student having a CI score at the end of the academic year. The CI scores showed a positive correlation with staff estimates of professionalism (6) and also with estimates of professionalism made by peers (7).

Conscientiousness refers to the amount of persistence, organisation and motivation in goal-directed behaviours (8) (9). The term is associated with specific behaviours which are associated with professionalism e.g. self-discipline, carefulness and thoroughness.

Conscientiousness is considered one of the 'Big Five' personality dimensions (10) and meta-analysis reviews suggest that it is associated with success across a range of occupations (10,

11). Recent work in the field of dentistry has shown correlations between the formal trait of conscientiousness (as measured by personality testing) and both academic and clinical success as well as professional behaviour (12). Within the medical literature, conscientiousness is associated with end of year exam performance in the pre-clinical years (13) and may be useful for selecting students for medical school (14).

Thus, while conscientiousness is unlikely to represent the totality of professionalism, it appears to be a significant component and this in turn suggests that the CI may provide an objective measure of a part of professionalism. A limitation of the original study was that it took place in a single medical school, amongst students in their early (pre-clinical) years. This study aimed to explore the generalisability of the CI by replicating the original work on CI in a different medical school, in a different country, and with students in the later phases of the medical course (the clinical phase; therefore we have termed this version of the Conscientiousness Index, the Clinical Conscientiousness Index, or CCI). We were interested to investigate if there was any correlation between the objective measure of the CCI and more traditional methods of measuring professionalism; portfolio assessment and performance in clinical examinations. We were also interested in the demographics of this cohort and whether there were any differences in conscientiousness between the sexes, and traditional students (under 21 years old) and mature students (over 21 years).

## **Methods**

**Sample:** This study was set in University College Cork (UCC), Ireland with year 3 undergraduate medical students (n=124) during the academic year 2009-10. Students have part-time clinical placements in term 1 and three full time clinical placements totalling 12 weeks in term 2. Assessment of professionalism comprises a portfolio and evaluation of

behaviour in an objective structured clinical exams (OSCE). The portfolio is a collection of case work, clinical skills log, peer work, tutor feedback and reflective writing on non-biomedical aspects of patient care. Students have two OSCE examinations in the year. These are both 8 station OSCEs with a mix of consultation and clinical skills stations, standardised by means of borderline regression (15).

Ethical approval was granted by the Clinical Research Ethics Committee of the Cork Teaching Hospitals. A key hypothesis underlying the study is that the data analysed is routinely collected by the medical school and thus no specific student consent is required (16) e.g. it is routine practice in our school to collect attendance data.

The local authors, in discussion with the authors of the original studies (6, 7), developed the *Clinical* Conscientiousness Index (CCI), reflecting the different learning environment to the original study. Due to variance in administrative policies, it was not possible to include all the domains used in the original study (see Table 1).

**Data collected:** In line with the original study (6), all students started with a baseline 50 CCI points. This was done to avoid some students CCI scores being negative at the end of the year. Conscientiousness points were then deducted and/or acquired from this baseline for reasons outlined below. The resulting CCI score was calculated as a percentage of the overall maximum score attainable.

**Attendance:** In UCC attendance at all teaching sessions is compulsory and attendance at less than 80% of teaching sessions is grounds for disbarment from examinations. This is emphasised to students from the outset of each year.



In term 1, students sign into formal teaching sessions (small group learning and clinical skills training). Students who were absent without reasonable cause (e.g. a sick note) were deducted one CCI point for each unexplained absence.

In term 2, an attachment form is completed for each student following completion of the clinical placement. All attachment forms require tutors to comment on attendance. Students were deducted one CCI point for poor attendance in term 2.

**Evaluative feedback:** At the end of each clinical attachment in term 2, students were sent an online evaluation form to complete. Students were awarded one CCI point each for completion. Our Virtual Learning Environment (VLE) has the facility to track those who have submitted course feedback without identifying the content of the feedback.

**Summative assessments:** In the original study (6, 7) Year 1 & 2 students were awarded CI points for correctly filling in an optical mark reader form and all assessments using this format were included. By Year 3, we felt that all students are competent at using this method and in UCC only one such exam is administered, the focus being on performance based exams e.g. OSCE. Given the complex nature of organising OSCEs, we weighted failure to attend this exam without an excuse, by deducting 5 CCI points.

**Negatively weighted items:** McLachlan et al (6) included negative weighted items e.g. failing to respond to repeated staff emails or attending teaching in an unfit state. Our school has a strict dress policy in place for clinical placements, which is made explicit to students; thus we deducted 1 CCI point if a tutor had to address this with a student whilst on clinical placement.

### **Data in the original index excluded from the current study**

Some items in the previous index (CI) relate to behaviours and activities relevant in the early phase of a medical course but are less relevant in later years, e.g. submitting information on vaccination status, and consequently these are not included in the current study.

The original (6, 7) conscientiousness index awarded points for evidence of volunteering. This inclusion was questioned as authors noted that such data could not always be rigorously collected. This data was therefore not collected in the present study.

In the first study (6) CI points were deducted for late submission of assignments. In the present study, school policy is to deduct marks commensurate with the time deviation from the stated deadline. As this aspect of behaviour is captured by our assessment process but not delineated separately in routine administrative data we did not include it.

### **Data now included in this index**

The Clinical CI included completion of an OSCE alert sheet. During the OSCE examination, trained examiners are asked to complete an alert page if they observe unprofessional behaviour e.g. hurting a patient during an abdominal exam. Such behaviours affect the station score but are additionally reviewed independently of exam performance. Feedback is communicated to the student and may trigger further review. We deducted one CCI point if such a sheet was completed.

A further item, which did not appear in the original Conscientiousness Index, was included - late registration for modules. Two CCI points were deducted for late registration. This item was weighted as all official information about courses, timetables and clinical placements, is

posted on our Virtual Learning Environment and failure to register means that students are unable to access any such information.

### **Validity: Correlation of CCI with staff judgements on professionalism**

Similar to the original study (6, 7), all clinical site tutors, who have ongoing regular contact with students (n=7) rated the students professionalism using the statements below. From these ratings a Professionalism Index (PI) was calculated for all students, anonymous to the students' CCI scores. This requires staff members to state if they are happy that the student is professional (+1), have concerns with the students professionalism (-1) or no mark is used if the staff member feels the student is not known well enough to them to comment. A total score comprises subtraction of the negative from the positive marks. The maximum score achievable was seven (as 7 tutors were involved). For example a student receiving 3 positive (+3), one negative (-1), and three neutral evaluations (0), receives a total score of +2.

**Data analysis:** Anonymised data on the CCI, PI and assessment (OSCE exam score and portfolio marks) was entered into SPSS version 15 for Windows. As the CCI data did not follow a normal distribution,  $D(124) = 0.12$ ,  $p < .01$ , a Mann-Whitney U test was used to compare the CCI for age and sex, and a Spearman's Rank correlation coefficient was used to assess any relationship between CCI data and staff views of professionalism (PI), OSCE results, and portfolio results. A  $p$  value of  $<0.05$  was considered as statistically significant.

## **Results**

The class comprised of 124 students; 56 male and 68 female, with an age range of 19 years to 31 years (average age 22 years).

The majority of students cluster at the upper range of CCI scores (range 70-100%, mean 89.8 SD 4.77; Figure 1). Professionalism Index (PI) scores ranged from -4 to +6, with an average score of +2. There was a significant relationship, with a moderate effect size, between CCI and PI;  $r_s = .3$ ,  $p$  (two-tailed) = .001. OSCE performance also significantly correlated with CCI;  $r_s = .24$ ,  $p$  (two-tailed) = .008. However, there was no relationship between CCI and portfolio results;  $r_s = .08$ ,  $p$  (two-tailed) = .354 (Table 2).

Females had a statistically significant higher CCI score ( $mdn = 91$ , range = 70-100) than males ( $mdn = 89$ , range = 80-100),  $U = 1484.0$ ,  $p = .033$ , however this is only a small effect size;  $r = -.18$

Mature students (over 21 years) CCI ( $mdn = 89$ , range = 70-100) didn't seem to differ from the more traditional students' (under 21 years;  $mdn$  CCI = 91, range = 81-100);  $U = 495.5$ ,  $r = -.14$ ,  $p = .241$

## Discussion

Our results confirm the validity of the Conscientiousness Index as a tool for investigating students' professionalism in the clinical years of undergraduate education. We demonstrate a significant positive correlation between the aggregate Clinical Conscientiousness Index score and professionalism as perceived by staff members who have taught the students. We have also shown a significant correlation between staff views and some current formal methods of measuring professionalism in UCC; suggesting concurrent validity of staff views of these students' professionalism.

We also demonstrate a significant correlation between the CCI and the OSCE exams. OSCEs are a competency based form of assessment informed by observation of behaviour. Our OSCE exams are assessed using a borderline regression method (15). This involves experienced clinicians making global judgements on students' performance of discrete tasks inclusive of student interaction with role-players, representing patients. Judgements are informed by grade descriptors. It is noteworthy that such grade descriptors reference organisation as a defining feature e.g. 'pass' students demonstrate an acceptable level of organisation, whereas 'borderline' students are more likely to display patchy performance. Our results emphasise the relationship between 'conscientiousness' as measured on the CCI and professional organisation in practice, albeit in a simulated environment.

We do not demonstrate a correlation between the CCI and the portfolio, although there is a positive correlation between staff views of professionalism and the portfolio. In our context the portfolio is used to demonstrate student achievement, inclusive of professionalism. One possible interpretation is that our portfolio comprises a range of activities, some of which may pertain to professionalism (e.g. reflective writing), whereas some components are simply the completion of tasks (e.g. completion of clinical skills logs). This serves to emphasise the importance of having clear definitions and objectives when using portfolios (17). This is a challenge for proponents of portfolio assessment (18). Future work could explore the relationship, if any, between conscientiousness and professionalism as measured by portfolios.

A significant difference is reported for CCI scores between males and females, with females gaining a higher score than males. However, the effect size for this is small. This has been

reported in the literature in self-reports of conscientiousness as measured by Big Five Inventory of personality traits (19).

The CI score is generated from objective data and can be a useful tool in reconciling or informing final decisions in relation to professionalism. It may reduce our tendency to ‘fail to fail’ borderline students whose behaviours cause concerns but where evidence to support a final decision e.g. an adequate number of observations of unsatisfactory behaviour is lacking (20). The combination of a Conscientiousness Index indirectly tracking a variety of behaviour over time, sequential supervisor assessments documenting directly observed behaviour in the workplace, and assessment of behaviours in standardised test conditions is potentially a robust blueprint for the assessment professionalism (21).

A strength of our results is that we have performed the study in a different medical school, in a different country, with students in a more advanced stage of training compared to the original study (6). Similar to the Durham cohort of students (6) we demonstrate that the majority of students score well on the CI – emphasising that most students are professional; submit their work on time, attend their classes (and thus pass their exams!) and give feedback to staff. This is consistent with our experience as teachers.

Of note, within our sample, one student performed particularly poorly on the portfolio, and interestingly also gained the lowest CCI score. However, this student was not judged by staff to be particularly unprofessional (gained a neutral Professionalism Index score) – presumably because suboptimal attendance or engagement meant that he was unfamiliar to or less inclined to come to the attention of staff who were thus unable to comment on his behaviour. Interestingly, this student subsequently withdrew from the course. This is an isolated but nonetheless impressive example of the potential added value or sensitivity of the CCI.

One of the key attractions of the Conscientiousness Index is that it purports to validate the cumulative use of routinely collected, objective data. It could be argued that a potential weakness of the current study is that we were unable to replicate the Conscientiousness Index in every aspect, due to a local variation in policy dictating which specific data is routinely collected. The items included in the initial work resonated with the types of information that any medical school would collect. However, gaining access to such data (e.g. if held within the central university as opposed to the medical school) and ensuring that such data collection is rigorous can be problematic and institutional variations are inevitable. We would suggest that the items included in the CCI are also highly representative of the types of data routinely collected in the clinical phase. Perhaps several iterations of the CI are acceptable once similar domains of student behaviour are measured.

Further evaluations of the use of the Conscientiousness Index might help to clarify this and perhaps define and refine what needs to be measured in different settings. It would also be useful to ascertain whether such an index remains constant over the duration of the course and for individual students. It may be that a chronic low scorer (such as the outlier shown in Fig 2) would be identified at an early stage allowing appropriate interventions which may include formal review, referral to relevant supports or structured course exits.

## **Conclusion**

We suggest that the Conscientiousness Index is a valid tool for measuring a major aspect of a medical students' professionalism which is now validated in more than one context and school. It has the advantage of being objective and relying on data already routinely collected at an administrative level. It is an instrument which can be modified for different

stages of training and which complements and correlates with other professionalism assessment formats allowing a more robust and perhaps defensible assessment of professionalism.

## **Competing interests**

None declared.

## **Authors' contributions**

All authors made substantial contributions to the study conception and design. MK was responsible for initial data collection and writing the first draft of the paper. MS led data analysis. All authors contributed to subsequent drafting and revision of the paper and all approved the final manuscript for publication.

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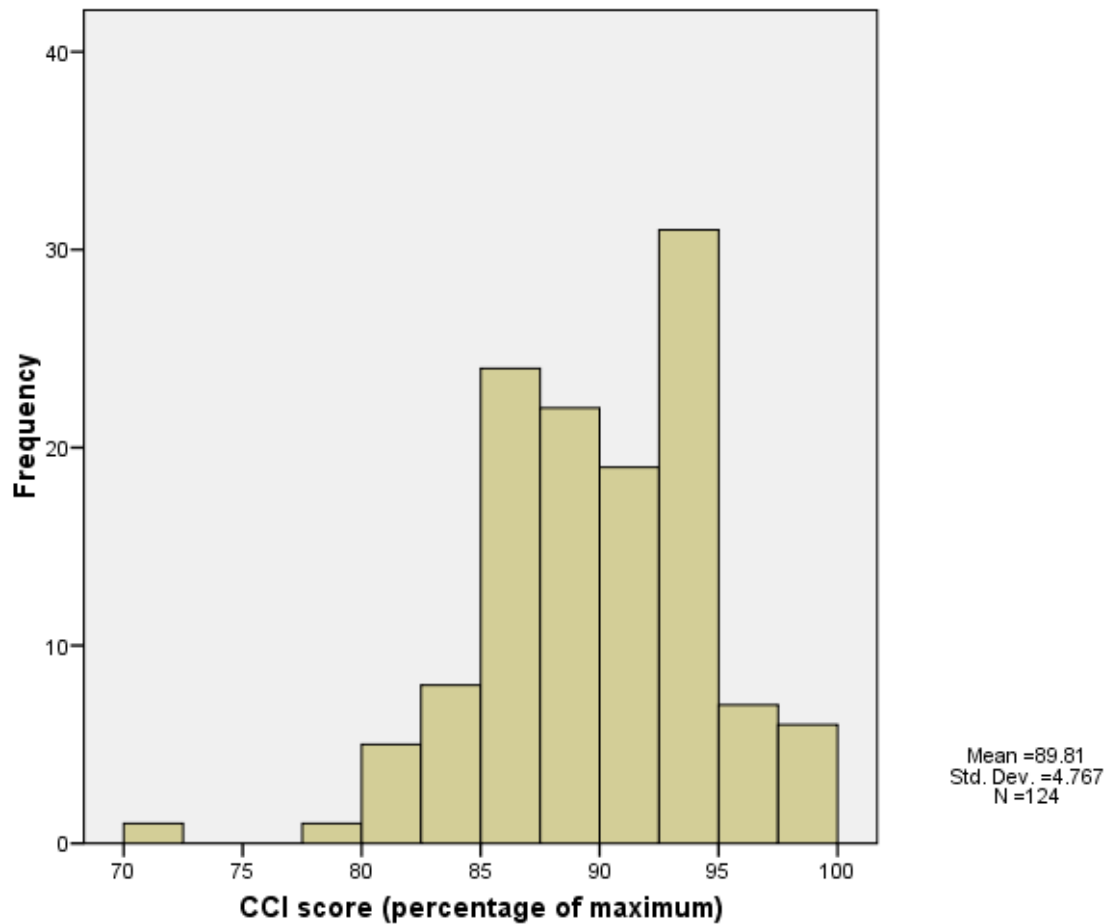
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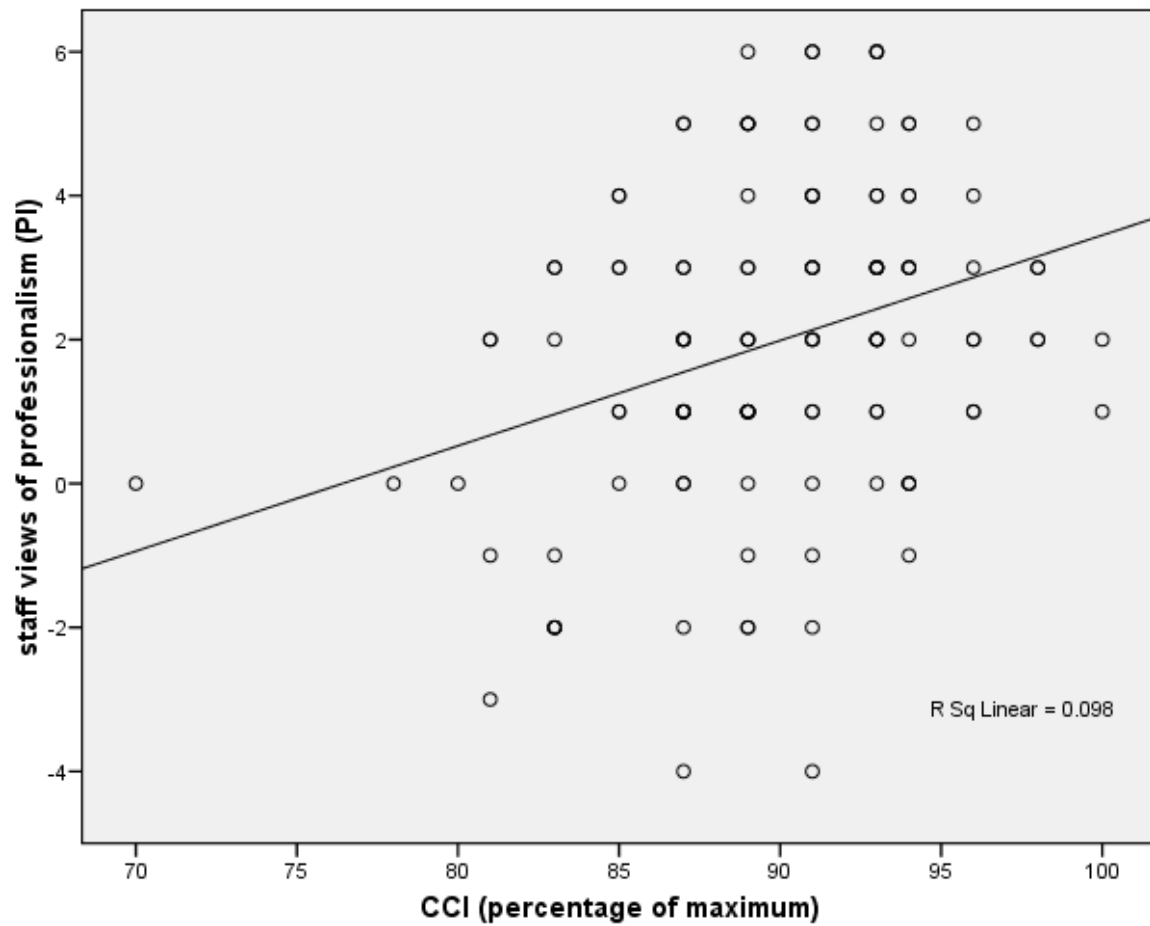
## Figures

**Figure 1: Histogram of Clinical Conscientiousness Index (CCI) Scores**

Frequency of CCI scores attained by the cohort, shown as a percentage of the maximum possible score attainable.



**Figure 2: Relationship between staff views of professionalism (Professionalism Index; PI) and Clinical Conscientiousness Index scores.**



## Tables

**Table 1: Data used to compile the Conscientiousness Index at the two sites.**

**This is to allow a comparison of CI items between the original study (6) and the current study.**

<b>Data source</b>	<b>Original (pre-clinical) Conscientiousness Index - Durham(6)</b>	<b>Points deducted/ awarded for CI</b>	<b>Clinical Conscientiousness Index - Cork</b>	<b>Points deducted/ awarded for CCI</b>	<b>Comment</b>
<b>Attendance</b>	Yes	-1	Yes	-1	Start with baseline points, -1 for non-attendance
<b>Submission of vaccination / police clearance</b>	Yes	+2/+1/0	No	N/A	submitted in pre-clinical years
<b>Evaluative feedback</b>	Yes	+1	Yes	+1	Completion of course evaluation forms
<b>Attendance at Summative assessments</b>	Yes	+1	Yes	-5	Variation between the two schools - Negatively weighted in UCC (see text)
<b>Timely submission of Summative assignments</b>	Yes	+1	No		For local administrative reasons this was not included
<b>Voluntary participations</b>	Yes	+1	No		Original work suggested this might be less objective than other data so excluded
<b>OSCE alert sheet</b>	No		Yes	-1	See text
<b>Negatively weighted items</b>	Yes	+1/-1	Yes	+1/-1	Inappropriate dress code, see text
<b>Late registration for modules</b>	No		Yes	-2	See text

**Table 2: Relationships between assessment domains, Clinical Conscientiousness Index (CCI) and staff views of professionalism (Professionalism Index; PI)**

$r_s$ , Spearman's Rho;  $p$ , probability

Assessment Domains	CCI	PI
OSCE	$r_s = .237 \quad p = .008$	$r_s = .366 \quad p = .000$
Portfolio	$r_s = .084 \quad p = .354$	$r_s = .313 \quad p = .000$